

The RM/RCN Hardware Implementation

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Requirements to the RCN

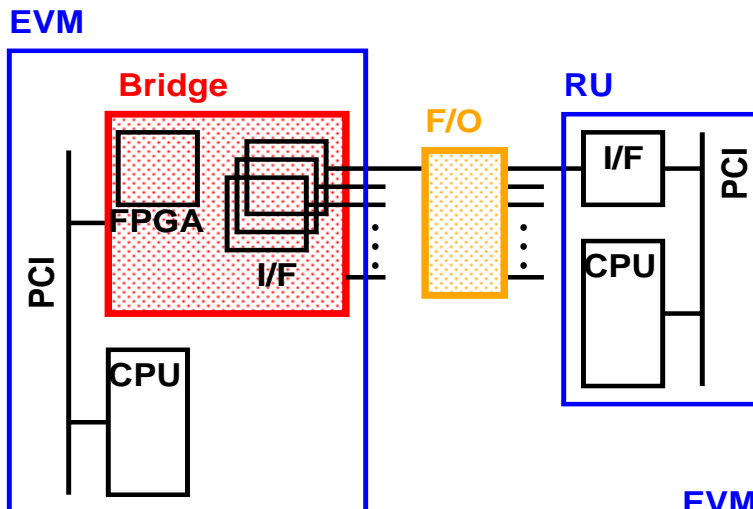
- Latency: 5ms (1k events buffering) – 150ms (32MB in RUI)
 - ➔ 100kHz L1
 - ➔ Fill half of the buffer in RUI or FE
- Bandwidth: 1.6MB/s + α
 - ➔ Four 32bit words / event
- Low cost
- Flexible
 - ➔ Configuration
 - ➔ Technology change

Technology Options

- FastEthernet ○
 - ➔ Slow, Inexpensive
 - ➔ Widely available
- Gigabit Ethernet
 - ➔ Fast, Expensive
- IEEE1394 ○
 - ➔ Fast, Inexpensive
 - ➔ Small hardware R&D necessary

IEEE1394 Option

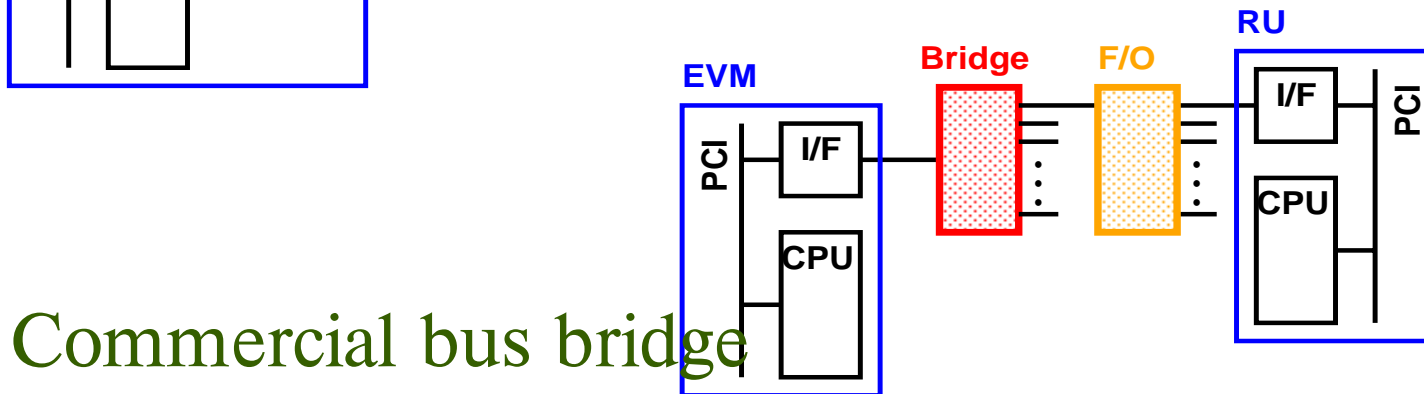
- # of nodes < 63 → We need bus bridges



Custom bus bridge

EVM-to-RU: Broadcast

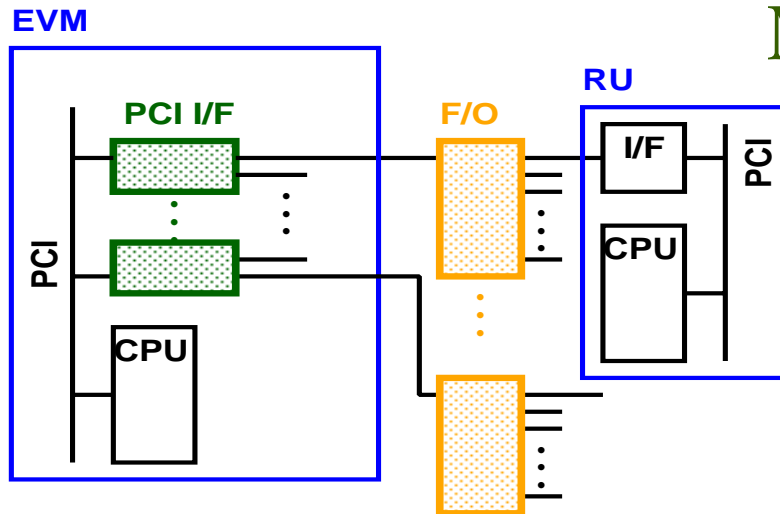
RU-to-EVM: Unicast



Commercial bus bridge

IEEE1394 Option (cont'd)

- If #RUs < 200



Multiple PCI I/Fs
(Four PCI slots)

Remaining Hardware Issues

- Current RM system: A Linux PC (dual CPU/PCI)
- RM hardware options:
 - ➔ Dual CPU PC
 - ➔ VME PowerPC board
- GTP I/F
 - ➔ S-Link64

Summary on the current development

- The new reliable broadcast library works with both Ethernet and IEEE1394.
- Ethernet/IEEE1394 are tested with the library.
- Both have enough bandwidth. IEEE1394 showed better reliability and timing fluctuation.
- The packet repairs took too long time (5ms), but still acceptable.
- The library will be put into XDAQ soon.

Future plan on the RCN

- More precise timing analysis of RCN library under various conditions
 - ➔ Parameters: # of RUs, Error rate, Ether/1394
 - ➔ Non-binomial packet drop probability distribution
- IEEE1394 isochronous transmission
- Integration to the XDAQ (FNAL test bench)
- Study with other OS (RT-Linux or VxWorks)